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miliar with these units is affirmed; but in these two pages a clear understanding of them is made well-nigh impossible. A single illustration will serve to show the character of many of these definitions.

"*The unit of tension* is that tension (potential difference) between two points which requires the expenditure of one unit of force (1 dyne) to move 1 coulomb from one point to the other by overcoming the electrical repulsion ($\text{Dim. } C^{\frac{3}{2}}G^{\frac{1}{2}}S^{-2}$).

"*Technical unit*, 1 volt = 10^8 (c. g. s.) units."

BARNARD'S PYRAMID OF GIZEH.

DR. BARNARD tells us that Mr. Flinders Petrie, after having published a book in 1874 to give 'irrefragable proof' of the supernatural metrology of the Great pyramid, in 1880 printed another in which he recants all that doctrine. This surprising instance teaches us that it is possible for a man to hold the views of John Taylor and Piazzi Smyth, and yet be capable of using his mind sanely upon the subject. But Mr. Petrie had shown himself by his 'Inductive metrology' to be an adept in the logic of induction; and surely one would expect the study of logic, if it be of any use at all, to save a man from such follies as this metrological theory of the pyramid.

The main fallacy of the advocates of it is one which has been pointed out in C. S. Peirce's 'Theory of probable inference' as a violation of the inductive rule that the characters for which a lot is sampled ought to be predesignate; that is, settled upon before the examination of the sample. Given a collection of numerical data, it is always possible, by twisting them about, to find some recondite and curious relationship between them; for the possibilities of such relationships are endless. Mr. Pliny Earle Chase has convinced the world of that, if of nothing else.

Another thing which the pyramid-bitten seem to overlook, is that an hypothesis antecedently likely does not mean one which they are antecedently inclined to like, but one which belongs to a class of explanations among which the balance of positive evidence tends to show that the true theory is to be looked for.

Dr. Barnard treats the subject with a great deal of pertinent wit; he has drawn from the stores of his learning for interesting informa-

tion on every page; and, what is best, he has estimated the strength of each argument with unerring good sense. Perhaps he is a little too indulgent to the idea that the vertical height of the pyramid was intended to bear the same ratio to the perimeter of the base that the radius of a circle bears to its diameter. Fourteen centuries after the building of the Great pyramid under King Apophis of the seventeenth dynasty (Joseph's Pharaoh, as it is said), was written the mathematical treatise of Ahmes, which has been preserved to us. This work virtually assumes

$$\pi = (\frac{3}{2})^4 = 3.16,$$

and there is no good reason for supposing that the pyramid-builder knew better. On the contrary, Sir Henry James's idea is probably correct, that the rule for the slope was, that at the corners the rise should be nine on a base of ten.

The supposition that the inclination of the entrance-passage was connected with a polestar, derives, it would appear, its chief strength from its forming a part of Mr. Procter's ingenious theory of the orientation of the pyramid, which certainly has much to recommend it; yet the accuracy of orientation may be merely accidental, like that of the District of Columbia.

NOTES AND NEWS.

MR. H. H. WARNER of Rochester, N. Y., offers two prizes for the year 1885. First, two hundred dollars for each and every discovery of a new comet made from Feb. 1, 1885, to Feb. 1, 1886, subject to the following conditions: 1. It must be discovered in the United States, Canada, Mexico, West Indies, South America, Great Britain, or the Australian continent and islands, either by the naked eye or telescope, and it must be unexpected, except as to the comet of 1815, which is expected to re-appear this year or next; 2. The discoverer must send a prepaid telegram immediately to Dr. Lewis Swift, director, Warner observatory, Rochester, N. Y., giving the time of the discovery, the position and direction of motion, with sufficient exactness, if possible, to enable at least one other observer to find it; 3. This intelligence must *not be communicated to any other party or parties*, either by letter, telegraph, or otherwise, until such time as a telegraphic acknowledgment has been received by the discoverer from Dr. Swift (great care should be observed regarding this condition, as it is essential to the proper transmission of the discovery, with the name of the discoverer, to the various parts of the world, which will be immediately made by Dr. Swift). Discoverers in Great Britain, the Australian continent and islands, West Indies, and South America, are absolved from the restriction in conditions 2 and 3. Second, a prize of two hundred dollars in gold to

The imaginary metrological system of the Great pyramid of Gizeh. By F. A. P. BARNARD. New York, Wiley, 1884. 5+106 p. 8°.

any person in the world who will write the best three-thousand-word paper on the cause of the atmospheric effects ('red light,' etc.) accompanying sunset and sunrise during the past sixteen months. It is desired that these papers be as original as possible in facts, observations, and treatment.

—Under the auspices of the Academy of natural sciences of Philadelphia, Prof. D. G. Brinton began on Jan. 26 to deliver a series of ten lectures on American ethnology and archeology. He will be followed by Professor Benjamin Sharp in a course of from twenty to twenty-five lectures on the principles of zoölogy; Professor Angelo Heilprin, a course of practical instruction in geology and paleontology; to be supplemented by field-excursions, and a final excursion to the region of the upper Delaware or the valley of Virginia, extending over a period of ten days or more; and Prof. H. Carvill Lewis, a course of twenty-five lectures on mineralogy and lithology, with practical demonstrations in the laboratory.

—The American philosophical society has just published an index to its Proceedings and Transactions down to 1883, prepared by Mr. Henry Phillips, jun., one of the secretaries. It will be found very useful, but would have been much more so had it been made in a single index, instead of in three, as at present. The simple prefix of P and T would have distinguished the Proceedings and the Transactions as readily as the present Roman numerals do the volumes; and a *T* could similarly have been made to indicate the old in distinction from the new series of the Transactions.

—The first number of the *Journal of mycology*, announced in a recent issue, has been received, and can hardly be said to promise much for the future of mycology in this country. It is almost wholly devoted to descriptions of new species; for the abstract of Wharton's paper on Fries's nomenclature of colors, taken from *Grevillea*, is of slight botanical value. If this number is an index of what is to come, it will be a matter of regret that the journal was ever started. The proper place for the description of species is in the proceedings of scientific societies, or in the reports issued by the different states or by the national government. In the case of a monthly journal, the necessity of filling the requisite number of pages must quickly result in the production of hastily or carelessly prepared descriptions, which will only be an encumbrance: the inevitable tendency will be to degenerate into a mere species-mill. Neither mycology nor any other natural-history science can hope for advancement through journals having no higher aim than this. And what shall we say to authors who describe one of their 'species,' and then add the following note: "It is quite probable that these are only the spores of some other fungus accidentally scattered on the leaves, and it is given here more especially to call attention to it, in order to ascertain its true character"?

—In the *Atlantic monthly* for February, Mr. Bradford Torrey has a pleasantly written paper on winter birds about Boston, in which he treats briefly the various species that enliven our fields and waysides at

this inclement season. The writer shows himself to be a keen discriminating observer, as well as an affectionately appreciative one, and has also a happy way of telling what he has seen. His paper will prove of interest to the ornithologist as well as the general reader.

—Mr. W. W. Valentine of Richmond, Va., in the specimen pages of his 'Comparative study of the new high German language, theoretical and practical,' evidently gives a translation of the notes of some lectures on German grammar which he once heard in Germany. Like most lecture-notes, they contain some mistakes, and are, except for a reader already familiar with the subject, obscure through their conciseness. And if there has been in this book any winnowing, any selection at all of topics to be treated, the winnowing has certainly left much chaff among the wheat. It is difficult to conceive of any class of students in America who could, with advantage, study German in such a grammar. We subjoin a few characteristic extracts: "Consonants accumulate in simple words and compounds. It occurs often from the syncopation . . . In compounds they accumulate very often. —In English sex determines class-distinction for the most part. —The *es* of the neut. nom. acc. (also voc.) is often omitted in folk-speech, and also in poetry where it stands in connection with euphony and quantity. —Relics of gender are found with the demonstrative *das* that. —*Essen* (better *essen*). [!!] —Reduplication occurred originally with the preterit stem of all stem verbs.—*fallen* to fold (redupl.) Only the past participle is preserved in literary language." [!!]

—The fourth number of the *Anuario bibliográfico de la República argentina*, by A. N. Viola (Buenos Aires, 1883), contains a good account of the publications issued in that country for 1882. It comprises political and social subjects, as well as scientific and technical, and aims to include every thing bearing an Argentine imprint. Scientific subjects are allowed thirty pages, which are filled chiefly with mention of the work accomplished by several government institutions, such as the universities and the Cordoba observatory, and by the scientific societies of Buenos Aires and Cordoba. The entire list fills six hundred pages, small octavo. Another local list that deserves mention is Trautwein's *Bibliographie der alpinen literatur* for 1883, that has appeared for the last fourteen years in the *Zeitschrift des deutschen und oesterr. alpen-vereins*. It contains about four hundred titles; but journals are entered only by their name, not by their contents. There are no abstracts, and the arrangement is only by name of author; so that convenience of use would require more care expended in its preparation.

—Mr. A. M. Elliott, in the Johns Hopkins circular for December, writes of a philological expedition to Canada:—

"In point of language, the Canadian French is certainly one of the most interesting topics for a philologist. Here we find that time has stood still, especially for the more remote rural districts; and the scholar could easily imagine himself holding

intercourse with the subjects of Louis XIV. This means that we have the unique privilege, in this age of steam and travel, of studying in them a form of speech that has scarcely known change for the past two centuries. But this idiom is not a dialect of that remote period; and the greatest surprise to a student of language arriving in Canada is to find, that, contrary to the general impression of scholars, the vernacular does not bear any specific dialectic character, but is the middle (sixteenth century) French, with those natural changes which would be produced by the intimate fusion into a whole of all the different species of language that were originally brought from the mother-country. An influence upon the language must be noted in the original seigniorial tenure which prevailed throughout Lower Canada. The seigneurs were the second sons of noble families who chose the better class of peasants to accompany them to their homes in the new world; and here each ruler laid out on the river his little kingdom (generally $\frac{1}{2} \times 3$ leagues in dimensions), which he divided among his colonists in concessions of 3×30 arpents. This arrangement produced a series of centres of civilization in which the lord and his educated friends were brought into more or less intimate contact with the common people: in truth, we have abundant evidence to show that the relation of the seigneur to his people was much more intimate in these early settlements of Canada than in the mother-country. After the conquest (1760), nearly all the nobles fled the country, and the different classes of society were more thoroughly mixed than they had ever been before. The influence of long and constant contact with a Teutonic race has had the effect to temper the rash impulses of the Gaul; and this is in no respect more marked than in his speech, where a quiet monotony largely prevails, and strikes the stranger immediately as one of its leading characteristics. It has not the rhythm, the inexhaustible variety, and rich cadence of the Gallic tongue as it is spoken to-day in France."

Mr. Elliott also records the apparent vigor of the old French stock, and their wonderful absorbing-power, as shown by the curious phenomenon of a people in certain sections having the racial characteristics of the English or Scotch, and bearing the names of Warren, Frazer, and McDonald, and yet unable to speak a word of the mother-tongue. The English names of roads and villages show who the occupants of such places were a few years ago.

— A circular from the U. S. signal-office informs us, that, in accordance with the general assent of co-operating weather bureaus, the observations at our signal-service stations, as well as those of the widely extended international system, are now taken eight minutes and twelve seconds earlier than formerly, the change having been made on Jan. 1. The new time of the morning observation, which corresponds to the daily international observation, is therefore seven A.M. of our eastern standard, corresponding to Greenwich mean noon; and this has the great advantage of being recorded with the same name for the day of the week the world over.

— It was stated last spring that quantities of floating pumice, supposed to be derived from Krakatoa during the recent eruption, reached the island of Réunion, at the harbor of St. Paul, on the 22d of March, 1884, having thus made a voyage of some two hundred and six days at a rate of six-tenths of a mile an hour. It now appears that an immense quantity of pumice of similar appearance, and supposed to be from the same source, reached Tamatave, Madagascar, in the first week of September, 1884. Specimens have been sent to the Société de géographie, and will be reported upon by the director of the School of mines.

— Capt. Lundin of the bark Vega, at Philadelphia, reports that at three A.M., Dec. 22, in latitude $40^{\circ} 31'$ north, longitude $16^{\circ} 10'$ west, he felt several slight shocks of an earthquake. It was calm at the time.

— The distribution of time on a commercial basis is claiming the attention of inventors and capitalists. Besides the Standard time company of New Haven (which has been idle the past year, owing to an arrangement with the Time telegraph company of New York, which has now been terminated by the former company), there are the Standard time company of New York, now organizing, to distribute time on the Mayerhofer system of compressed-air impulses, synchronizing and winding secondary clocks; the National time-regulating company of Boston, which proposes to give audible signals over telephone-lines, which can be heard after the manner of repeating watches by placing the telephone to the ear; a company with headquarters at Pittsburg, which is to use the system devised by Mr. Gardner for long or short distance telegraph time-signalling and clock-synchronizing; the Time telegraph company of New York, which has shown its best development in the electric dial system in Providence; the Wenzel pneumatic system of clocks, actuated by compressed air acting through the medium of glass air-holders lifted out of a glycerine bath at each impulse; and we suppose that we shall soon have companies organized on the Popp-Resch-Mayerhofer system, now used in Paris, and the Mautner system of Vienna. Apropos of the subject, A. Merling has published an excellent little book on electrical clocks, entitled 'Die electrische uhren; Electrotechnische bibliothek, band ii. (Braunschweig, *Friedrich Vieweg und sohn*, 1884, 323 p., 12°); and M. A. Favarger continues his articles through the current year of the *Journal Suisse d'horlogerie* (Geneva), on 'L'électricité et ses applications à la chronométrie.'

— Dr. Hugo Gyldén, whose call to the professorship of astronomy in the university of Göttingen, made vacant by the death of Dr. Klinkerfues, we noted some time ago, has, in consequence of a liberal offer from the king of Sweden, decided to remain at his present post as astronomer royal, and director of the observatory at Stockholm. Dr. Gyldén is one of the editors of the new journal entitled *Acta mathematica*.

— Dr. Th. Brédichin has resigned his position as director of the observatory at Moscow, Russia.

— The Roumanian government has voted the funds necessary for the establishment and maintenance of the Central meteorological observatory in Bucharest, and Mr. Hepites has been appointed the director.

— In November, 1884, Mr. Maxwell Hall, director of the Kempshot observatory, Jamaica, attacked again the question of the variability of the light of Neptune as bearing on the planet's rotation on its axis. He finds that fifteen rotation periods occupy 118.71 hours; so that each period is 7.914 hours, — a result which he considers identical with the period derived from his observations in 1883.

— The Lena polar expedition, commanded by Lieut. N. D. Jurgens, who arrived at St. Petersburg on Jan. 4, has proved a success. No one died or was seriously ill; scurvy, which appeared the first winter, being quickly suppressed. The second winter was somewhat milder than the first, although the spring and autumn were cooler. In western Siberia, in the *taiga* (forest) north of Jenisseisk, there was rain, and the rivers were open, as late as the 1st of December. The lowest temperature experienced by Lieut. Jurgens was $-50^{\circ}\text{C}.$; but the chief inconvenience was the frequent storms, although observations were not interfered with. Those of the first year have already been calculated by Mr. Eigner, who arrived in St. Petersburg in advance. The summer was almost without sun; and $12^{\circ}\text{C}.$, the highest temperature recorded, was reached only once. This had a decided effect on the vegetation. Mosses were almost the only plant observed, and willows grow to a height of a few inches only, though inland, where the sea wind does not penetrate, they reach two feet. Magnetic disturbances were less frequent and important the second year than the first; thus proving the wisdom of the scientific men, who insisted that the observations should be made in 1882-83. The survey of the delta considerably changes our ideas about this region. Among other things, Sagastyr, where the observations were made, is not the most northern point of the delta; but this honor belongs to the Island Dunas, 74° north. The changes of water-level at Sagastyr are considerable; the expanse of water being too large for high river-floods, and the tides small and irregular, largely influenced by the winds. Lieut. Jurgens left Sagastyr on July 8, passed several days at Yakootsk, whence he reached Kireusk by steamer in twenty-four days, and continued by boat on the Lena for two hundred versts; he was then obliged to travel by land, as ice was fast forming on the river. The journey to Irkutsk was made difficult by the lack of snow, which was also largely the case between Irkutsk and Neuberg, where he took the railroad. A telegram has just been received from Dr. Bunge, the naturalist of the expedition, who has not returned, stating that he is on the way to Irkutsk, where he will winter, and whence he will start early in the spring for the basin of the Jana, north-eastern Siberia, which he will explore in 1885, and in the spring of 1886 he will start for the New Siberia Islands.

— The publications of the second geological survey of Pennsylvania make steady progress. Reports

on Cameron, Elk, Forest, Perry, Huntington, and Delaware counties, are in press. Reports on Lebanon, Dauphin, Cumberland, and Franklin counties, are partly prepared for the press, together with the remaining sheets of the South Mountain survey, one additional atlas and the second report of the progress of the anthracite survey, the second part of the report on the Monongahela collieries, and the second part of the report on Perry and Juniata counties. The state geologist has prepared a hand-atlas of the state, reducing the county maps in common use to a uniform scale of six miles to an inch, and coloring them geologically, according to the reports of progress in their respective districts, made to him by the assistant geologists of the survey. This atlas is just about to issue from the press. The board of commissioners has just recommended an appropriation of ninety thousand dollars for the next two years; twenty-five thousand dollars to be expended annually to continue the anthracite survey; ten thousand dollars annually to continue the topographical survey and commence the construction of a state map; and ten thousand dollars annually to extend the oil-region survey, to continue the chemical analyses of minerals, to provide for economic geological examinations in the bituminous and iron-ore regions, and to continue the work of the state geologist.

— At the annual meeting in February, according to *Nature*, the Royal astronomical society will award its gold medal to Dr. W. Huggins for his researches on the motions of stars in the line of sight, and on the photographic spectra of stars and comets. This is the second time that Dr. Huggins has received the medal, he, in conjunction with the late Professor Miller, having received it in 1867, for his researches in astronomical physics.

— At a meeting of the French academy of sciences on Jan. 5, Mr. Pasteur presented a paper, in the name of Mr. Duclaux, on the germination of plants in soil free from microbes. Mr. Duclaux had undertaken experiments in order to determine the effect of the presence of microbes upon germination. In his experiments he used pease and Holland beans, the cotyledons of which uniformly appear, one below the soil, the other above. The soil had been previously sterilized by processes of which the author gave no details, and, in addition, had been moistened with milk also sterilized. Under these conditions, germination did not take place, and at the end of two months the milk showed no indication of alteration. These two experiments tend to prove that the presence of microbes in the soil is necessary to the development and to the life of plants. Pasteur added some critical reflections. He mentioned that he had before this proposed to his pupils to examine what would happen to an animal subjected from birth to nourishment the elements of which had previously been freed of microbes, and consequently reduced to its nutritive principles, pure and simple. To this he had been led by the idea that in such conditions the maintenance of life and development would be impossible with animals. This conclusion leads to the

very important knowledge that the presence of microbes in foods is indispensable to digestion; that is to say, of actions necessary to the elaboration of matters destined to serve for the nutrition of the animal body. The total absence of microbes renders the accomplishment of these actions impossible. We can recognize the importance of an exact determination of the part played by microbes in digestion; for this knowledge would lead to interesting views, and perhaps to practical results, regarding the mechanism and treatment of different forms of dyspepsia.

—The enterprising scientific publisher, Doin, of Paris, sends out with the first number of *Revue scientifique* for this year the first number of a new journal, called *Journal des sociétés scientifiques*, which is to appear weekly, and to contain a brief report of the meetings of the principal scientific societies of the great cities of Europe. The plan of the journal is an excellent one, and one which should secure it an ample subscription list. It costs only fifteen francs, postage paid, to any part of the universal postal union. The first number contains reports of the French academy of sciences, the academy of medicine, and the geographical, anthropological, and biological societies of Paris, the societies of public medicine and of surgery, as well as of the academy of medicine of Belgium and Vienna, and the clinical society of London. It forms a quarto of ten pages.

—Among recent deaths we note the following: Benjamin Silliman, at New Haven, Jan. 14, at the age of sixty-nine; John Birmingham, astronomer, at Millbrook, Tuam (Ireland), Sept. 7, at the age of sixty-eight; Antoine Quet, physicist, at Paris, Nov. 29, at the age of seventy-four; Dr. E. V. Ekstrand, botanist, at Upsala, Nov. 10; A. Kefenstein, lepidopterologist, at Erfurt, Nov. 28; Dr. Wilhelm Rüppell, the first scientific explorer of Nubia and Abyssinia, at Frankfort-on-Main, Dec. 11, at the age of ninety; Auguste Chevalat, one of the founders of the French entomological society, at Paris, Dec. 16, at the age of eighty-five.

—With the completion of volume x. (for 1882), Dr. L. Just will resign the editorship of the *Botanisches jahresbericht*, which will then be privately conducted by Dr. E. Koehne of Berlin, and Dr. T. Geyler of Frankfort-on-Main.

—By the will of Mr. George Bentham, who died in September last, the Linnean society of London, and the Royal society scientific relief fund, will receive, *Nature* states, a thousand pounds each. The residue of his real and personal estate is to be held upon trust, to apply the same in preparing and publishing botanical works, or in the purchase of books or specimens for the botanical establishment at Kew, or in such other manner as his trustees, of whom Sir Joseph Hooker is one, may consider best for the promotion of botanical science.

—A "Report on the Egyptian provinces of the Sudan, Red Sea, and Equator, compiled in the intelligence branch quartermaster-general's department,

horse-guards," has just been published by the war-office at London for three shillings and sixpence, and will be found of great service to those following the current events in upper Egypt, especially as it contains a capital map, and descriptions of all the routes of travel in the Egyptian Sudan known in July last.

—The capuchin, Father Massaga, who has spent thirty-five years as missionary in the African desert, has been commanded by the pope to write his memoirs, that they may be published by the curia. The memoirs will be in ten volumes, and will be illustrated by a Viennese artist.

—We learn from *Nature* that the German government has granted another sum of £7,500 for the scientific investigation of Central Africa, and £1,900 for the working-out of the materials collected by German polar expeditions.

—James Jackson, secretary of the French geographical society, has issued a new edition of his list of velocities. The first velocity given is that of the Mer de Glace, — according to Tyndall, .0000099 of a metre per second. The last, 463,500,000 metres per second, is that of the electricity in a wire connecting the inside and outside of a Leyden jar. What is meant by the latter velocity is not quite clear, when we consider that we can no more speak of the velocity of the conduction of electricity than we can of the velocity of the conduction of heat.

—Dr. Zulinski has published in a Warsaw medical journal the results of a long series of experiments made by him, both upon human beings and animals, with a view of verifying the physiological effects of tobacco-smoke. He found, in the first place, that it is a distinct poison, even in small doses. Upon men its action is very slight when not inhaled in large quantities; but it would soon become powerful if the smoker got into the habit of 'swallowing the smoke:' and Dr. Zulinski ascertained that this toxic property is not due exclusively to the nicotine, but that tobacco-smoke, even when disengaged of the nicotine, contains a second toxic principle called colidine, and also oxide of carbon and hydrocyanic acid. The effects produced by tobacco depend, he says, to a great extent upon the nature of the tobacco and the way in which it is smoked. The cigar-smoker absorbs more poison than the cigarette-smoker, and the latter, in turn, than those who smoke pipes; while the smoker who takes the precaution of using a nargile, or any other apparatus which conducts the smoke through water, reduces the deleterious effects of tobacco to a minimum. Dr. Zulinski considers the artificially lightened tobaccos to be more dangerous than the darker-colored ones.

—The article on economy of fuel, on p. 74 of this volume, contains an error to which a correspondent calls attention. It should have stated that the Oregon consumes 337 tons of coal per day, which gives combustion at the rate of over 1,500 pounds of coal for each mile traversed.